

one of the first and second substrates having a top surface and a bottom surface, and an anti-reflection film is coated or placed on at least one of the top surface and the bottom surface.

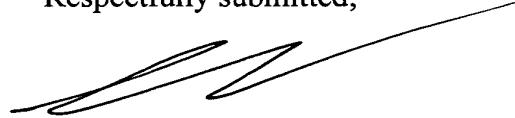
30. (Amended) The solar cell unit as set forth in claim 25, wherein at least one of the first and second substrates is arranged at the side from which solar rays enter, the at least one of the first and second substrates having a top surface, and a light catalyst made of titanium dioxide (TiO₂) is coated on or placed on the top surface of the at least one of the first and second substrates.

REMARKS

Claims 1-30 are pending. By this Preliminary Amendment, the specification, abstract and claims 1, 5-17, 23 and 25-30 are amended. No new matter is added. Prompt and favorable examination on the merits is respectfully requested.

The attached Appendix includes marked-up copies of each rewritten paragraph (37 C.F.R. §1.121(b)(1)(iii)) and claim (37 C.F.R. §1.121(c)(1)(ii)).

Respectfully submitted,



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Attachments:

Substitute Abstract
Appendix

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ABSTRACT

The solar cell of the present invention includes a titanium dioxide semiconductor that
is held between a pair of electrodes so that the titanium dioxide semiconductor and at least
one of the electrodes form a rectification barrier.

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APPENDIX

Changes to Abstract:

The following is a marked-up version of the amended Abstract:

ABSTRACT

~~A conventional dye-sensitized solar cell is a wet cell employing an electrolyte such as an iodine solution or the like, it is necessary to seal the solar cell with a sealing compound or the like in order to contain the iodine solution therein. Therefore, there are many problems in that, for example, leakage of electrolyte solution occurs when the sealing is broken. Furthermore, when only a flat-shaped titanium electrode is used, current and voltage of practically required levels can not be secured because the absorption area of solar rays is small.~~ The solar cell of the present invention, ~~employing a porous titanium dioxide semiconductor, is characterized in that the~~ includes a titanium dioxide semiconductor that is held between a pair of electrodes so that the titanium dioxide semiconductor and at least one of the electrodes form a rectification barrier.

Changes to Specification:

Page 1, line 1 is deleted.

~~TITLE OF THE INVENTION~~

Page 1, between lines 2 and 3, a new heading is added.

BACKGROUND OF THE INVENTION

Page 1, line 3:

1. Field of the Invention ~~FIELD OF THE INVENTION~~

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Page 1, line 8:

2. Description of the Related Art~~BACKGROUND ART~~

Page 2, line 26:

~~DISCLOSURE OF THE INVENTION~~

SUMMARY OF THE INVENTION

Page 9, line 21:

~~BRIEF DESCRIPTION OF THE DRAWINGS~~

BRIEF DESCRIPTION OF THE DRAWINGS

Page 10, line 13:

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS~~BEST MODE FOR~~

~~PRACTICING THE INVENTION~~

Changes to Claims:

The following are marked-up versions of the amended claims:

1. (Amended) A solar cell, ~~employing a titanium dioxide semiconductor,~~
comprising:

a pair of electrodes; and

a titanium dioxide semiconductor which is disposed between the electrodes,
the titanium dioxide semiconductor defining a surface and an interior, the surface and the
interior of the titanium dioxide semiconductor being formed with pores, and the titanium
dioxide semiconductor being arranged so as to form a rectification barrier with respect to at
least one of the pair of electrodes.

5. (Amended) The solar cell as set forth in ~~any one of~~ claims 1 to 4, wherein the
electrode, with which said titanium dioxide semiconductor forms the rectification barrier, is
formed in such a way as to penetrate into the surface of the titanium dioxide semiconductor
and the interior thereof.

6. (Amended) The solar cell as set forth in ~~any one of claims 1 to 5~~, wherein said titanium dioxide semiconductor has a porosity of 5 to 90%.

7. (Amended) The solar cell as set forth in ~~any one of claims 1 to 5~~, wherein said titanium dioxide semiconductor has a porosity of 15 to 50%.

8. (Amended) The solar cell as set forth in ~~any one of claims 1 to 5~~, wherein said titanium dioxide semiconductor has a porosity of 20 to 40%.

9. (Amended) The solar cell as set forth in ~~any one of claims 1 to 8~~, wherein said titanium dioxide semiconductor is porous and has the fractal structure.

10. (Amended) The solar cell as set forth in ~~any one of claims 1 to 9~~, wherein the at least one of the pair of electrodes, with which said titanium dioxide semiconductor form the rectification barrier, is formed from a transparent electrode made of ITO ~~or the like~~, or a metallic electrode made of at least one metal selected from the group consisting of Al, Ni, Cr, Pt, Ag, Au, Cu, Mo, Ti, and Ta, ~~or a metal compound containing therein any one or more of these metals~~.

11. (Amended) The solar cell as set forth in ~~any one of claims 1 to 9~~, wherein the at least one of the pair of electrodes, with which said titanium dioxide semiconductor forms the rectification barrier, includes a solid iodide.

12. (Amended) The solar cell as set forth in claim 11, wherein the at least one of the pair of electrodes, with which said titanium dioxide semiconductor forms the rectification barrier, includes CuI (copper iodide).

13. (Amended) The solar cell as set forth in claim 11, wherein the at least one of the pair of electrodes, with which said titanium dioxide semiconductor forms the rectification barrier, includes AgI (silver iodide).

14. (Amended) The solar cell as set forth in ~~any one of claims 1 to 13~~, wherein the pair of electrodes are formed by vacuum evaporation.

15. (Amended) The solar cell as set forth in ~~any one of claims 1 to 13~~, wherein the pair of electrodes are formed by spattering.

16. (Amended) The solar cell as set forth in ~~any one of claims 1 to 13~~, wherein the pair of electrodes are formed by printing.

17. (Amended) The solar cell as set forth in ~~any one of claims 1 to 16~~, wherein said titanium dioxide semiconductor is subjected to visual rays absorbable processing to enable absorption of visible rays.

23. (Amended) The solar cell as set forth in claim 17, wherein said titanium dioxide semiconductor includes impurities that include at least one of ~~such as~~ Cr and/or V.

25. (Amended) A solar cell unit ~~employing a titanium dioxide semiconductor~~, comprising:

a solar cell which includes a pair of electrodes, and a titanium dioxide semiconductor disposed between the pair of electrodes, the titanium dioxide semiconductor being formed with pores; and

first and second substrates, ~~which holds the solar cell~~ being disposed between the first and second substrates ~~therebetween~~.

26. (Amended) The solar cell unit as set forth in claim 25, wherein the first and second substrates are arranged so that solar rays enter from ~~one~~ the side of one of the first and second substrates, ~~in which the other substrate being arranged at a side of the one substrate that is opposite to the one side and being the opposite side~~ is coated with a reflection film or having a reflection film thereon.

27. (Amended) The solar cell unit as set forth in claim 25 ~~or 26~~, wherein ~~the space between the first substrate and the second substrate~~ define a space therebetween, the space being filled with an inert gas including ~~such as~~ argon gas.

28. (Amended) The solar cell unit as set forth in ~~any one of claims 25 to 27~~, wherein at least one of the first and second substrates being arranged at a side from which solar rays enter, the at least one of the first and second substrates being is formed into a transparent substrate or a translucent substrate formed of at least one of glass, plastic and or synthetic resin.

29. (Amended) The solar cell unit as set forth in ~~any one of claims 25 to 28~~ wherein at least one of the first and second substrates is arranged at a side from which solar rays enter, the at least one of the first and second substrates having has a top surface and a bottom surface, and an anti-reflection film is coated or placed on at least one of the top surface and the or bottom surface.

30. (Amended) The solar cell unit as set forth in ~~any one of claims 25 to 29~~ wherein at least one of the first and second substrates is arranged at the side from which solar rays enter, the at least one of the first and second substrates having has a top surface, and a light catalyst made of titanium dioxide (TiO₂) is coated on or placed on the top surface of the at least one of the first and second substrates.

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APPENDIX

Changes to Specification:

Page 1, line 29 to page 2, line 4:

On the other hand, a new type of solar cell, which is referred to as "wet solar cell" or "fourth-generation photocell", was proposed in 1991 by ~~Gletzel~~Grätzel et al. As shown in Fig. 9, this wet solar cell includes one electrode 901 formed of titania (titanium dioxide), which is a semiconductor, and another electrode 902 formed of platinum, ITO or the like, and these electrodes are held in an electrolyte solution 903, such as an iodine solution.